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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,897	10/14/2003	Hiroaki Niimi	TI-34570	4865

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EXAMINER

THOMAS, TONIAE M

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 10/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/684,897	Applicant(s) NIIMI ET AL. 	
	Examiner Toniae M. Thomas	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-11 is/are allowed.
- 6) ☒ Claim(s) 12-16 is/are rejected.
- 7) ☒ Claim(s) 17-22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) ☒ Notice of References Cited (PTO-892) | 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) ☐ Notice of Informal Patent Application (PTO-152) |
| 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/14/03</u> . | 6) ☐ Other: _____ |

DETAILED ACTION

1. This action is a first Office action on the merits of Application Serial No. 10/684,897. Currently, claims 1-22 are pending.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. *Claims 12 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Wu et al. (US 6,303,482 B1).*

The Wu et al. patent (Wu) discloses a method for forming a transistor over a semiconductor substrate 31 (figs. 4-7 and accompanying text). The method comprises: placing the substrate in a process chamber, wherein the substrate comprises a gate dielectric layer 34 having a surface, and wherein one or more airborne molecular contaminants 42 reside on the surface of the gate dielectric layer (fig. 4 and col. 3, line 66 - col. 4, line 13);¹ flowing an oxygen-source gas into the process chamber at a first pressure (col. 4, lines 13-27); forming a first plasma with the oxygen-source gas in the process chamber at a first power for a first predetermined amount of time, therein combining the one or more airborne molecular contaminants with oxygen species of the first

plasma to form one or more product gases; and removing the gases from the process chamber (col. 4, lines 13-27).²

The one or more airborne molecular contaminants comprise hydrocarbon contaminants, wherein the one or more product gases comprise carbon dioxide gas and hydrogen gas (col. 4, lines 13-27).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. *Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu.*

Wu lacks anticipation in not teaching that the first predetermined amount of time is less than approximately five seconds, or that the first pressure is between approximately 0.05 Torr and 2 Torr. However, it would have been obvious to one of ordinary skill, at the time the invention was made, to use the pressure and the amount of time as claimed, since it has been held that where general conditions of a claim are disclosed in the prior art,

¹ The contaminant 42 resides on a sidewall surface of the gate dielectric layer.

² Admittedly, Wu does not explicitly teach flowing the oxygen-source gas at a first pressure and forming the first plasma at a first power for a first amount of time. However, it is inherent that the oxygen-source gas is flowed at a first pressure and the plasma is formed at a first power for

discovering the optimum or working ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233).

Wu lacks anticipation in not teaching that the first predetermined amount of time is dependent upon an amount of hydrocarbons on the surface of the substrate. However, determining the amount of time according to the amount of hydrocarbons is within ordinary skill. Thus, claim 15 is taken to be obvious over Wu.

Allowable Subject Matter

4. Claims 1-11 are allowable. Claims 17-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Wu does not anticipate, teach or suggest the steps of: flowing a nitrogen-source gas into the process chamber at a second pressure; and forming a second plasma with the nitrogen-source gas in the process chamber at a second power for a second predetermined amount of time, to nitridize the gate dielectric. There is no teaching or suggestion within the prior art of record to modify Wu by flowing a nitrogen-source gas into the process chamber at a second pressure; and forming a second plasma with the nitrogen-source gas in the process chamber at a second power for a second predetermined amount of time, to nitridize the gate dielectric.

a first amount of time, since power, pressure, and time are process parameters in plasma forming processes.

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References Cited

The Luo et al., Sun et al., Terakado et al., and San et al. references are cited only as art of interest. See the PTO 892 form attached hereto.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday-Thursday from 8:30 a.m. to 5:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MMJ

30 September 2004


AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800